

IMAGE FORMING APPARATUS AND METHOD OF CONTROLLING EXPOSURE UNIT USED THEREFOR

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Patent Application No. 10-2015-0106100, filed on Jul. 27, 2015, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

BACKGROUND

[0002] 1. Field

[0003] The present disclosure relates to an image forming apparatus and a method for controlling an exposure unit used therefor.

[0004] 2. Description of the Related Art

[0005] In general, image forming apparatuses using electrophotography, such as laser printers, copy machines, multifunctional apparatuses, and facsimiles, include an optical scanner. The image forming apparatuses perform an operation of printing a desired image by forming an electrostatic latent image on a surface of a photosensitive drum using light beams outputted from the optical scanner and then transferring the electrostatic latent image onto paper.

[0006] An electrophotographic image forming apparatus such as a color laser printer includes four photosensitive drums prepared to respectively correspond to four colors of yellow, cyan, magenta, and black, an exposure unit for forming an electrostatic latent image of a desired image by scanning light onto each photosensitive drum, a developing device for developing the electrostatic latent image with a developer for each of the four colors, and an image forming medium (e.g., a transfer belt) for forming a color image completed by sequentially receiving and superimposing the images developed on the photosensitive drums and then transferring the formed color image onto paper.

[0007] Therefore, to print one desired color image, a final color image is generated by developing images of respective colors on the four photosensitive drums and superimposing the developed images on a same image location of the image forming medium and is printed on paper.

[0008] However, to correctly generate a desired color image by superimposing the images of the four colors on the same image location of the image forming medium, a start point and an end point where an image is transferred from each photosensitive drum to the image forming medium are needed to be all the same for the four colors. Because even though images are clearly developed on the four photosensitive drums, if the developed images are transferred to the image forming medium with a different location little by little, an incorrect color image is finally obtained.

[0009] Therefore, to correctly realize a color image, it is important to correctly match an exposure start time point of each photosensitive drum by the exposure unit by taking into account a traveling speed of the image forming medium, and setting a plurality of colors to be correctly superimposed to form one image is called color registration.

[0010] However, a photosensitive drum has a periodic linear velocity change. This is a phenomenon naturally occurring in all practical rotary systems except for an ideally perfect rotary system, and there are a plurality of causes such

as a photosensitive drum shape error (eccentricity, run-out, or the like), a drum alignment/mounting property, a gear shape error, a gear transfer error, gear train structural incompleteness, a coupling angular velocity transfer error, and the like. The linear velocity change of the photosensitive drum, which occurs due to the causes, becomes a direct cause of a color mismatch.

SUMMARY

[0011] Provided is an image forming apparatus capable of reducing an influence according to a linear velocity change of a photosensitive drum by controlling an exposure timing of an exposure unit and a method of controlling the exposure unit.

[0012] Provided is an image forming apparatus for compensating for a skew of a toner image by individually controlling light source modules of an exposure unit.

[0013] Additional aspects will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the presented exemplary embodiments.

[0014] According to an aspect of an exemplary embodiment, an image forming apparatus includes: at least one rotatable photosensitive drum; at least one exposure unit configured to form an electrostatic latent image on a surface of the photosensitive drum and including a plurality of light sources arranged along a main scanning direction; a developing unit configured to form a toner image by developing the electrostatic latent image formed on the surface of the photosensitive drum; a transfer medium to which the toner image formed on the surface of the photosensitive drum is transferred; a detection unit configured to detect a linear velocity change of the photosensitive drum, which occurs when the photosensitive drum rotates; and an exposure controller configured to control an exposure timing of the exposure unit based on the linear velocity change of the photosensitive drum, which is detected by the detection unit.

[0015] The exposure controller may be further configured to control an interval of the exposure timing of the exposure unit to be shorter than a reference interval if a linear velocity of the photosensitive drum is faster than a reference velocity and to control the interval of the exposure timing of the exposure unit to be longer than the reference interval if the linear velocity of the photosensitive drum is slower than the reference velocity.

[0016] The exposure controller may be further configured to control the exposure timing of the exposure unit by taking into account a phase of the linear velocity change of the photosensitive drum.

[0017] The photosensitive drum may include a plurality of photosensitive drums taking in charge of different colors, and the exposure unit may include a plurality of exposure units corresponding to the plurality of photosensitive drums.

[0018] The detection unit may be further configured to detect a linear velocity change of each of the plurality of photosensitive drums, and the exposure controller may be further configured to control an exposure timing of each of the plurality of exposure units based on the linear velocity change of each of the plurality of photosensitive drums.

[0019] The exposure controller may be further configured to control the exposure timing of the exposure unit such that offsets according to the linear velocity changes in the plurality of photosensitive drums are removed or match each other.